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ABSTRACT

A discussion of computer authoring systems examines the uses and limitations of authoring systems and describes a multifunctional system designed for computer-assisted language instruction and learning. The section on authoring systems in general looks at their evolution and at misunderstandings of their potential and capacity. The system described, called DRILL, consists of three main modules that allow the teacher to write and organize exercises, allow the student to do them, and tabulate the results. It is language-independent and can be used at all educational levels. The main modules and their subfunctions are outlined, and some instructional features and advantages are noted. (MSE)

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AUTHORING SYSTEMS IN CALL: NOT A FALSE DIRECTION

The multifunctional authoring-system DRILL

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1. The practical utility and the limits of authoring-systems

Are authoring-systems really useful? The answer to this question, asked many times and in many places already, of course depends exclusively on the quality of the programs. In fact, given a certain type of amateurish educational software in Europe--and elsewhere--and especially its deplorable quality, one could as well put the question in this way: is CALI--or CALL--really useful?

Actually, I just want to say that only real quality software is worth evaluating. And when I apply the term quality-software to CALI-software, I mean that it must come up to the highest pedagogical, didactical, technical and financial expectations, and that all-round user-friendliness is paramount!

Some researchers pretend that authoring-systems are not useful, period. Such an absolute assertion cannot be taken seriously: all too often the very authoring-systems criticized have not been examined and tested with regard to their pedagogical, didactical, technical and financial qualities and their user-friendliness! In fact, it is very easy to criticize whatever educational software package: use a package in a wrong application, and it can be qualified as a bad one. Paraphrasing the Sinatras, I should say: "Boots are made for walking"--not for swimming.

The quality of authoring-systems, therefore, must be evaluated with regard to various parameters, such as:

- the specific applications for which they are designed and developed;
- the public for whom they are meant;
- the level at which they must be used;
- the available hardware;
- the familiarity of potential users with data processing applications;
- the familiarity of potential users with CALL-and CALI-applications;
- etc.

In a word, authoring-systems are too often evaluated as if they were universal CALL- or CALI-systems, as if they could be used for any educational purpose--which is impossible. The same holds for a manual. A manual can be very good and useful within a specific discipline at a certain level, but

inconsistent or incomplete at another level, even useless for some applications within or outside the discipline concerned. It must be admitted that the first authoring-systems that were published were too often presented as the final and absolute solution to all problems in CALI... I think that in educational matters--and especially in computer assisted instruction--there will never be a final solution... Moreover, there's nothing more dangerous than a computer freak in a classroom--whether it be a student or a teacher--the latter is perhaps the more dangerous.

Let us stop considering the computer as that final solution for everything; let us instead take an honest but hard look a what that marvellous machine can do for us teachers, who want to use all available and effictive means to make intelligent and competent people of our students or pupils...

In the history of educational software, one generally distinguishes the following phases:

a. In the initial phase, that of single programs, a programmer had to write different programs for each exercise or for each lesson; very often, the programmer and the teacher were different individuals who did not always really understand each other's pedagogical and technical problems;

b. This was the major reason why so-called authoring languages were developed. The principal goal of these authoring-languages was to enable the teacher himself to make lessons and exercises. It was claimed that authoring-languages were simplified programming languages which would indeed allow the teacher to write his own programs. But experience has proved that teachers had great difficulty writing programs, even in an authoring-language, which seemed to be too complex a system to be learned and exploited efficiently by most teachers. In fact, the authoring-language was often nothing more than just another programming language...

c. This is why authoring-systems were developed. An authoring-system is a software package whose major characteristic is great user-friendliness. The teacher does not need to know anything about data processing: he generally works in a menu-driven and conversational technique to make lessons or exercises. It is an irrefutable fact that authoring-systems--especially the good ones!--have been at the basis of the spread and popularity of

educational software.

But it is precisely this user-friendliness that constitutes a danger in the evaluation of authoring-systems. Users often think that an authoring-system can be used for any educational purpose. People, especially inexperienced people, often have exaggerated expectations of data-processing applications and expect their computers to "know" and to "do" everything. Some people have already learned that this is not really the case...

An authoring-system still demands some work of the teacher: he must still make the lesson or the exercises himself. Some (lazy) teachers prefer a kind of ready-made programs or exercises they only have to put into a disk drive. They forget that the range of applications and possibilities of an authoring-system is much more broader than that of a ready-made software package, however good that may be.

Exaggerated expectations in, and failure to exploit all the possibilities of, authoring-systems are two of the main reasons why people often consider them to be useless.

However, I myself as well as several of my colleagues at the University of Antwerp have learned that an authoring-system CAN be useful, provided that

a. the authoring-system is not used outside of the range of applications for which it has been developed;
b. a serious and honest evaluation of the real uses and of the results of the authoring-system is made;
c. all the criticims of teachers and students or pupils are taken into account;
d. one is prepared to correct, adapt, extend and even substantially modify the authoring-system on the basis of a great amount of practical experience.

That is what we tried to keep in mind while working with my authoring-system DRILL, which I would now like to present.

2. The authoring-system DRILL: general characteristics

DRILL is a multifunctional authoring-system specially designed for computer-assisted language learning (CALL) and computer-assisted language

instruction (CALI). It contains three principal modules:

a. a MANAGER, which allows the teacher to write and organize exercises;
b. a DRILLER, which allows the student/pupil to do them;
c. an ANALYZER, which tabulates the student's/pupil's results, thus allowing the teacher to evaluate both his students/pupils and the effectiveness of his exercises.

(a) and (c) are protected by passwords.

DRILL is language-independent, which means that it can be used for all languages for which a specific character set is available on a PC, e.g., Dutch, French, English, German, Latin, Spanish. However, DRILL can also be used in other disciplines. In fact, different schools in Flanders and in the Netherlands also use it in geography, history, etc.

DRILL can be used at all educational levels, from primary school to university. Users of the system must be able to work on a traditional keyboard, but they do not have to know anything about data processing. They only must be told how to put a floppy into a disk driveand how to switch on the computer. After that everything is menu-driven.

DRILL has now been used at the University of Antwerp (UFSIA, Departments of Romance and Germanic Philology) for more than 5 years. The system was developed in different phases; the current version is release 4.0.

Using DRILL requires a PC with minimum 64 Kb RAM (at the University of Antwerp we have versions running on APPLE IIe, BURROUGHS 20B, IBM-PC (compatibles and clones) and IBM PS/2.), one disk drive (and naturally MS-DOS for IBM and compatibles, Apple-DOS for the APPLE IIe, or BTOS for the BURROUGHS B20), a monochrome screen (24 lines and 80 columns), and the DRILL floppy. A printer is desirable but not necessary.

3. The MANAGER

This module contains different submodules, of which the most important are the ones enabling the teacher to make exercises and the one enabling him to define the parameters and scenarios of the students' exercises.

For each question the teacher wants to put into the system, he has to type in (two or) three blocs of information. The first two blocs--DATA and QUESTION (the two may be collapsed)--are those which the student will see on the screen when he does his exercise. In these two blocs the student must be given all the necessary information to find his answer. But the teacher is absolutely free to put whatever information in DATA and/or QUESTION. The third bloc must contain the right answer(s) (maximum 8). Some examples:

French
DATA : Il faut que vous ... davantage.
QUESTION : Mettez TRAVAILLER à la forme correcte.
ANSWER : travailliez

German
DATA : Er ist ...
QUESTION : Fill in and translate: of the first rank
ANSWER : ersten Ranges

English
DATA : His feelings are "very much" hirt.
QUESTION : Replace "very much" by an adverb
ANSWER : deeply

Dutch
DATA : Hij ... deze vraag perfect.
QUESTION : BEANTWOORDEN, O.V.T.
ANSWER : beantwoordde

In actual practice, most teachers put the same type of exercises on one floppy (and on the numerous copies they make): a floppy with exercises on verb conjugation, one on the placement of adverbs, one on the morphology of the adverb, one on the French participe passé, one on the morphology of French or Dutch or German nouns and adverbs, and so on. Here are some examples of the numerous possible applications:

a. ENGLISH: must, have to, ought, etc.
b. FRENCH: accord du participe pass{
c. GERMAN: nominal declination

d. DUTCH: spelling problems
e. All languages: conjugation of verbs
f. : the use of prepositions
g. : morphology of the adverb (not in Dutch or German)
h. : vocabulary
i. : morphology
j. : fill in-exercises
k. : definitions of grammatical terminology
l. : expressions and idioms
m. : translations
etc.

The system allows the teacher to correct, change, adapt, modify, and delete any question, both while making the exercise and afterwards. It automatically writes the (modified) questions on the floppy and assumes the management of all the data (with a maximum of 250 questions on one floppy). Naturally it is not necessary to write all one's questions in one session: this can be done in different sessions over several days, weeks or even months. But the teacher can always get an overview of what is on a floppy (either on screen or on hard copy).

The MANAGER also allows for the initialization of a floppy. When a class or a group of students have done several exercises with a floppy, the teacher can re-initialize the floppy (and the copies) in two ways.

1. A complete initialization means that the teacher erases all the data he or the student/pupil on the floppy. After such an initialization, he will have a "new empty" floppy on which he can make other kinds of exercises.

2. In a partial initialization the teacher retains the questions on the floppy but erases the error data, i.e., all the students' and error counters are put back to zero. After such an partial initialization, the floppy will look as if no student had ever done any exercise on it.

The reader will already have realized that a school needs only a single floppy, simply because this master can be copied endlessly--with or without exercises and/or error data on it.

Another very important submodule of the MANAGER is called PARAMETERS. This allows the teacher to define which scenario he will choose for the students' exercises. The following parameters can be selected.

1. The teacher can ask a student to input his name whenever he does an exercise. This allows the ANALYZER to make an error analysis for each individual student and enables the teacher to see what kind of errors a specific student has made. However, the teacher can also select "Anonymous" for simple drilling, when he does not need to know which students have made this or that kind of error.

2. The teacher can define how many questions a student must answer in one session (minimum 5 and maximum 30), but he can also let the students choose.

3. The teacher can define the language version of the DRILLER: each floppy of DRILL has English, French, Dutch and German versions. Selecting, e.g., the English version, means that all comments and instructions in the DRILLER will be given in English.

4. We will see (in 1.2.) that a student can have up to four chances to give his answer. The teacher decides which score he will give for a good answer on the first, the second, the third and the fourth attempt--and/or, if he so wishes, how many marks he will substract for each wrong answer on these four attempts. He can also simply give 0 for a wrong answer.

5. The teacher can activate or deactivate the error typing routine, which allows the student to correct his answer before the system considers it definitive.

6. The teacher can make any question on the floppy available or unavailable. Making a set unavailable means that the question remains on the floppy, but that a students working with the DRILLER will not get it until the teacher has made it available again. This also means that the teacher can make a series of, e.g., 250 questions of which he only makes 100 (easy or specific) ones available in the first phase.

7. When a student has made an error, the teacher can tell the system to print the right answer on the screen (feedback). But he can also refuse to show

the right answer--for instance, in examinations or tests.

8. When then teacher has selected the feedback option--he can activate a rewriting routine, which requires the student to copy the right answer on the keyboard.

9. The last parameter is a very important one: the teacher can select the help mode of the exercises.

9.1. In mode 1, the student gets no help at all from the system. He simply must type in his answers.

9.2. In mode 2, the student does get help (i.e., correct answers) from the system, but when he makes errors, they are printed onscreen.

9.3. In mode 3, the student also gets the correct answers from the system, but only those, even when he types in a wrong character or answer. In other words; this mode never shows a wrong answer never appears onscreen!

All these parameters can be reset at all times.

4. The DRILLER

As we have already explained, the details of the scenario of the DRILLER depend on the way the parameters have been set by the teacher. But the fundamental structure of the exercise is as follows:

a. Phase 1

For each question, the student sees DATA and/or QUESTION on the screen and has to type in an answer. If the answer is right, he gets the following question. If the answer is wrong, he will get another opportunity to give the correct answer. If the answer is wrong again, it will depend on the parameter settings whether he gets the right answer and whether he has to copy it.

b. Phase 2

There will be a phase 2 when the student has made at least one error in phase 1. Each question which the student has answered incorrectly in phase 1 will be presented again in phase 2 (following the same scenario as in phase 1).

c. Closing phase

After having done phase 1 and 2, the student gets his score and, if he wants one, a hard-copy print-out of the questions to which he has given wrong answers. After that he can stop or go on to do another session.

5. The ANALYZER

The student does not see that his results and error data are automatically written on the floppy. (Of course he can be told.) These data will be the basis of the error analysis. The following data, among others, can be produced by the system.

In the general error analysis, pertaining to all students, the system will give:

1. the number of times that the system selected (at random) all questions;
2. the number of correct answers to each of these questions on the 1st, 2nd, 3rd and 4th attempt;
3. the number of wrong answers to each of these questions on the 1st, 2nd, 3rd and 4th attempt;
4. the percentage of right and wrong answers to each question;
5. the overall percentage of right and wrong answers.

In the selective error analysis the teacher can ask for an error analysis for any question he wants, by typing in the number of that question, or by typing in part of the text of the question (even one single word).

In the degressive error analysis the system will classify all the sets in the following order: at the top of the list, the teacher will find the set on which the students made the most errors (e.g. 100 % errors), then the set with 99 % errors, then 98 % and so on, down to a percentage the teacher defines himself. So, he can ask a degressive error analysis of all the sets on which the students made an average percent of errors of 50 %.

In the degressive error analysis the system will classify the questions in descending order of difficulty: from the question that elicited the highest number of errors (e.g., 100%), down to a percentage the teacher can define himself. Thus he can ask for a degressive error analysis of all the questions to which the students gave an average percentage of wrong answers of 50 %.

Of course, the teacher can also ask for a list of the names of all the participants--arranged alphabetically or not--with their scores.

Each error analysis can be printed out onscreen or on hard copy.

6. Some didactic and pedagogical aspects

a. The fact that the system is "empty" when he starts allows the teacher to put into the authoring-system nearly any type of exercise he wants. DRILL is an educational software package meant for teachers who do not belong to the category of the lazy ones... However, this does not mean that making an exercise battery with DRILL takes a lot of work--not at all. And one must not forget the almost absolute freedom he has in the choice, the content and the form of the exercises he wants to make.

b. The numerous parameters which the teacher can set allow him to adapt the DRILLER to the level of his students, to the content and type of his exercises, to their applications (simple drill, test, examination, etc.), to the mother tongue of his students, etc.

c. Experience has taught me and my colleagues that students like working with this system very much. They generally prefer doing DRILL-exercises to doing

traditional exercises on a sheet of paper--which means that, for certain kinds of exercises which can be efficiently automated in DRILL, the motivation of students is very high.

d. The possibility of immediate feedback makes of DRILL not only a simple drill and practice-system, but also a real learning-system. Something similar holds for the three help-modes: when students get help during their exercises, they can really learn something.

e. The error analysis provides extremely detailed information about the students' proficiency, about their attendance and progress (which students have come to work with DRILL, which students have done enough exercises), about the degree of difficulty of the questions, etc. In fact, the information provided by the error analysis can be used by the teacher as a basis to organize and define the contents of his traditional (non-computer assisted) lessons and to differentiate individual educational procedures in the classroom. As a matter of fact, the greatest surprise for most teachers is provided by the results of the ANALYZER, which gives them a type of statistical data they are not used to.

f. Perhaps the most important conclusions about DRILL are:
   1. that the system has now been used continuously for more than 5 years by all kinds of teachers and professors, including in particular teachers who had never worked with a computer before, but who nevertheless mastered it very easily;
   2. that DRILL is being used at different educational levels (in Flanders and in the Netherlands, from primary school to university, and also in adult education);
   3. that DRILL, though initially developed for CALI, is useful and effective in other disciplines and matters;
   4. that DRILL is now used primarily in CALI-exercises in English, French, Dutch, German and Latin;
   5. that the following stuation typically obtains: two or three students working at an exercise, at a computer in or outside the classroom, which in fact already constitutes an interesting conversational situation, motivating the students to discuss the exercise, the results, the feedback, etc.;
   6. that DRILL has already been substantially adapted and modified several

times account being taken of the remarks of the users--professors, teachers, students and pupils--so that there is now a completely revised release 4.0 and that even a release 4.1. is already being prepared. (Note that users always get a free copy of each new release.)

Please, do not tell to all these enthusiastic people that an authoring-system is useless, that you cannot do anything interesting with an authoring-system, that it is too complex to be used by teachers or students--and I could imagine a whole series of other criticisms. But, before people talk about whatever educational system, tell them that they should first look honestly and objectively at these systems, or rather, that they should first use them with their students.

There are really a lot of prejudices concerning CALI, both for and against. In fact, authoring-systems--and I would not know why DRILL should be an exception--are not at all universal systems allowing you to do almost anything. On the contrary, each authoring-system--just like a manual--has its limits, which the teacher has to get to know and to define. Moreover, I am the first to agree that a teacher must not try to do absolutely everything on computers. There are a lot of procedures--especially in language instruction--that cannot reasonably be done on a computer. Too great enthousiasm is as bad as too critical an attitude, and perhaps a lot more dangerous...--but that's another problem!